

Unit (1) Mass and weight

Mass : The amount of matter in an object

Measuring units:

Gram (gm), Kilogram (kg) and ton.

- **Gram:**
  - It equals the mass of one paper clip
  - Used to measure small masses (gold & chemicals)
- **Kilogram:**
  - It equals the mass of one liter of distilled water.
  - Used to measure large masses (fruits & vegetables)
- **Ton:**
  - used to measure very large masses.

1 Kilogram = 1000gram
1 Ton = 1000 kilogram

Measuring devices of mass: scales

1) Balance scale**:** used to measure large masses.
2) Sensitive balance: used to measure small masses.
3) Digital balance.
4) Two arms scale with pointer.

Properties of mass:

1- Mass increases by increasing the amount of matter.
2- Mass doesn't change by changing the physical state
3- **Mass has a constant value** .The mass doesn't change by changing place (mass on moon = mass on earth).

G.R.F: The mass of a person on moon equal its mass on earth.
-Because the amount of matter doesn't change by changing place.

Weight (gravitational force)
It is the force with which a body is attracted to earth

Measuring unit: Newton

One Newton is almost equal to weight of an object whose mass is100gm

Measuring device: Spring scale

The weight is determined by determining the extension of the spring

The effect of the weight is directed towards the center of the earth.

Note: **Mass has no direction**

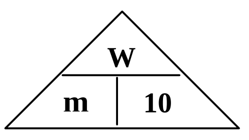
Factors affecting weight:

1. The object's mass.
2. The planet where the object exists.
3. The distance between object and center of planet.

1) The object's mass:

Weight of object on earth increases by increasing the object's mass

Weight (Newton) = Mass (kg) x 10



2) The planet where the object exists:

As the mass of planet increases, gravitational force increases and weight of the object increases.

Earth has greater mass and gravitational force than moon.

Weight of object on moon = $\frac{1}{6}$ its weight on earth

3) The distance between object & center of the planet:

The weight (gravitational force) **decreases** as the distance between the body and the center of planet increases**.**

Give reason for:

a) The weight of any body is different as the planets differ.

- As the mass of the planet increases, the gravitational force increases and the weight of the body increases.

b) The force of the moon's gravity is less than the earth's gravity.

- Because the mass of the moon is smaller than the mass of the earth.

c) **An object's weight is affected by the distance being away from the center of the planet.**

- Because the weight decreases as the distance between the object and the center of the planet increases.

Evaluation

1) Complete:-

1- The mass of a liter of water equal to ………………

2- The mass of a paper clip is nearly equals to ……………..

3- Sensitive scale is used to measure ………………… masses.

4- ……………… is the force with which a body is attracted to the earth's surface.

5- Weight of an object can be measured by …………………

6- Weight increases as ……………….. increases.

7- Weight decreases as the distance away from the earth's core ………………

9- The object's weight on moon is equal to ……………… of its weight on the earth.

10- The measuring units of mass are ……………… or ………………..

11- The measuring unit of weight is …………………..

12- As the mass of the planet increases, its gravitational force …………………..

2) Write the scientific term:-

1- The force exerted on a body by the gravity of the earth. [ ]

2- A device used to measure the weight of any object. [ ]

3- A device is used to measure the mass of large objects. [ ]

3) Choose:-

1- The object's weight on the earth's surface is equal to ……….. as the object's weight on the moon.

a) 6 times b) 2 times c) 1 times d) 7 times

2- The amount of matter in an object is ………………..

a) weight   b) distance   c) mass   d) gravitational force

3- When the mass of an object is 35 kg , its weight will be ………….

a) 40 N   b) 76 N   c) 350 N   d) 400 N

4- If the weight of an object on earth's surface is 120N , so its weight on moon's surface is ……….

a) 40 N   b) 30 N   c) 20 N   d) 100 N

5- The weight of the body during flying in a plane is …………. its weight on the ground.

a) less than   b) more then   c) equal to   d) no effect

4) Solve the following problems:-

1- Calculate the weight of an object; its mass is 0.4 kg.

……………………………………………………………………………………………

……………………………………………………………………………………………

2- Calculate the mass of an object, its weight 120 Newton.

……………………………………………………………………………………………

……………………………………………………………………………………………

3- If the weight of an object on earth's surface is 180 N calculate.

- It's weight on moon's surface.

- It's mass on the moon's surface.

……………………………………………………………………………………………

……………………………………………………………………………………………

4- An object whose mass on earth is 90 kg calculate its weight on both the surface of earth and moon.

……………………………………………………………………………………………

……………………………………………………………………………………………

5) Give reason for:-

1- The body is attracted towards the earth.

……………………………………………………………………………………………

……………………………………………………………………………………………

2- The weight is different from one place to another.

……………………………………………………………………………………………

……………………………………………………………………………………………

3- An object's weight on the moon is equal to 1\6 of its weight on earth.

……………………………………………………………………………………………

……………………………………………………………………………………………

4 - The mass of any object is constant.

……………………………………………………………………………………………

……………………………………………………………………………………………

6) What is meant by :

1- Cube of iron its mass 100 gm .

……………………………………………………………………………………………

2- The weight of an object = one Newton .

……………………………………………………………………………………………

7) What happens to weight of a person in high balloon ?

……………………………………………………………………………………………

Unit (2) Thermal energy

Lesson (1) Heat conduction

Heat:

It is a form of energy that transfers from the higher temperature objects to the lower temperature objects.

Uses of heat energy:

1) **At home in:** warming houses , cooking , heating water and drying washed clothes.
2) **In many industries :** - Making and processing food.
   - Manufacture of glass, paper, …….

Temperature:

It is the degree of hotness or coldness of a body

Temperature is measured by a device called **Thermometer**

Materials are different in conducting heat, and are classified into:

1) **Good conductors of heat:** They are the materials that let heat flow through. Examples: metals as iron, copper, and aluminum.
   - **Copper conducts heat faster than aluminum and iron.**
   - **Aluminum conducts heat faster than iron.**

   (Copper > aluminum > iron)
2) **Bad conductors of heat(Heat insulator):** They are the materials that don't let heat flow through. Examples: wood, glass, plastic, and gases (air).
   - **Air is used in making insulating glass windows by bonding two glass sheets and leaving space filled with air to prevent leakage of heat.**

Uses of good and bad conductors of heat:

1) Metals (aluminum, copper and stainless steel) are used in making cooking pots and kettles.
2) Handles of cooking pots, iron, and kettles are made of wood or plastic.
3) Wool is used in making heavy blankets and woolen clothes to prevent leakage of heat and keep the body warm.

Evaluation

A) Complete:

1-……………….,……………..and……………are from importance of heat in our life.

2-Materials are divided into………….conductors and ………………

3-……………is used in making heavy blankets and ……… that keeps the body warm.

4-Mercury is ……………………. conductor of heat.

5-Plastic is …………… conductor of heat ,while copper is …………conductor of heat.

6- ………………………… conducts heat faster than aluminum .

B-Write the scientific term:

1- The fastest metal in conduction of heat. [ ]

2- Materials that are used in manufacturing of handles of cooking utensils.

[ ]

3- The energy that transfers from hot materials to the cold materials.

[ ]

C) What happens if :

- Your hand touches a piece of ice .

……………………………………………………………………………………………

……………………………………………………………………………………………

D) What is meant by good conductor of heat , mention only example and one usage .

……………………………………………………………………………………………

……………………………………………………………………………………………

E) Give reason for:

1-Heat is important form of energy in our life.

…………………………………………………………………………………………
…………………………………………………………………………………………

2-If you hold apiece of ice, you will feel hot.

…………………………………………………………………………………………
…………………………………………………………………………………………

3-Iron is a good conductor of heat.

…………………………………………………………………………………………
…………………………………………………………………………………………

4- We wear wool clothes in winter.

…………………………………………………………………………………………
…………………………………………………………………………………………

Lesson (2) : Measuring temperature

Importance of measuring temperature :

1) Know the weather temperature .
2) Know the body temperature to check our health .
3) Some processed food industries requires a certain temperature .

Note :

Touch helps us to know if the object is hot or cold , but it can't measure the temperature .

Thermometer :

A device used to measure temperature .

✷ **Idea of making thermometer :**

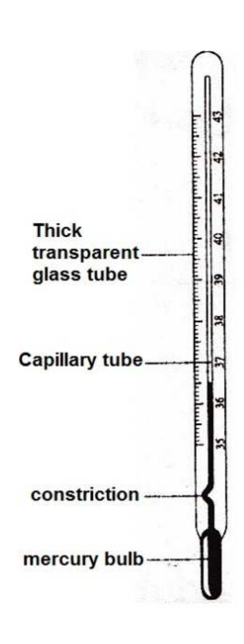
Changing the volume of liquid according to temperature i.e. (liquids expand by heating and contract by cooling) .

✷ Types of thermometers :

1) Medical thermometer .
2) Celsius thermometer .

1) Medical (clinical) thermometer :

- Used to measure the temperature of human body .
- Range from 35°c to 42°c .
- Each degree divided into ten parts .
- **Note** : The temperature of healthy human is 37° c .



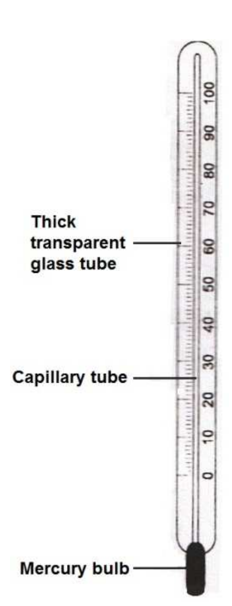
Importance of constriction :

Prevents mercury from returning back quickly before reading the temperature .

How to use clinical thermometer to measure temp :

1) Sterilize the thermometer using ethyl alcohol .
2) Dry it well using a tissue paper .
3) Shake it well until mercury goes back to the bulb .
4) Put it under the tongue for a minute .
5) Get it out from mouth and record the reading .
6) Sterilize the thermometer using ethyl alcohol and put it in its box .

Celsius thermometer :



- Used to measure the temperature of liquids .
- Range from zero degree to 100°C .
- Every degree is divided into ten parts .
- The lower fixed point represents the melting point of ice (0°C) .
- The upper fixed point represents the boiling point of water (100°C) .
- There is no constriction in Celsius thermometer .

✸ **Give reason for :**

Mercury is preferred in making thermometer .

1) It is a liquid metal that can be seen easily .
2) A good conductor of heat .
3) Expand regularly .
4) Doesn't stick to the walls of capillary tube .
5) Mercury remains liquid between -39 C and 307 C this gives wide range to temperature Measurement.

Note:

Some thermometers contain two scales , one represents Celsius scale and the other represents fahrenhit scale (0C =32F and 100C=212F).

Evaluation

1-The graduation of Celsius thermometer starts from………………..to…………..

2-We use ……………… to sterilize the…………………..thermometer

3-We must keep thermometers away from reach of children because …………………is poisonous.

4-The main idea for making thermometers is changing the…………………of liquid by increasing of heat.

5-Mercury is ………………… conductor of heat.

6-……………………….. thermometer has a constriction, but ……………………thermometer hasn't constriction.

7-Mercury is a…………..metal that can be ……………. Easily through the thermometer glass tube.

8-The medical thermometer is characterized by presence of…………above mercury bulb.

9-Mercury doesn't stick to………………….

Give reason for :

1- The medical thermometer must be put in the alcohol before using it.

……………………………………………………………………………………………
……………………………………………………………………………………………

2-The medical thermometer can't measure the temperature of the ice water.

……………………………………………………………………………………………
……………………………………………………………………………………………

3- The mercury is the suitable liquid can be used to make the thermometer .

……………………………………………………………………………………………
……………………………………………………………………………………………

Write the scientific term :

1-the thermometer which graduated from 0C° to 100C° [ ]

2- The degree of the hotness or coldness of the body. [ ]

3- A part of the medical thermometer that prevents the mercury to return back quickly .

[ ]

4- A liquid metal which used in making thermometers . [ ]

What happens if :

There is no constriction above the mercury bulb in the medical thermometer .

………
………

Mention the function of :

1- **Mercury** : ……………………….………………………………………………………………..

2- **Clinical thermometer** : ……………………………………………………….………………

Look at the opposite figures then answer :

This is ……………………………….

Used to measure ………………………………

1- ………………………………..

2- ……………………………….

4- ……………………………….

- **This is** ………………………….....

Used to measure ……………………………….

1- ……………………………….

2- ……………………………….

3- ……………………………….

Unit (3) : The atmosphere

Lesson (1) : Oxygen

The atmosphere:

Mixture of gases surrounding the earth

- Atmosphere is attracted to earth by **gravity.**

Importance of atmosphere:

1) Protect the earth from harmful ultraviolet radiation.
2) Adjust the temp. of earth.

- **The atmosphere is filled with solid objects** (dust particles, smoke, & gases).(pollutants)

Importance of solid objects: help in condensing water vapor and falling of rain.

Main components of atmosphere:

1) Nitrogen (78%), most abundant gas.
2) Oxygen (21%).
3) Carbon dioxide, water vapor, and other gases.

Oxygen gas

Represents 21% of air volume (or $\frac{1}{5}$ of air volume).

Structure: Oxygen molecule consists of two oxygen atoms (O_2)

Source:

- Green plants are the main source of oxygen.
- Oxygen is produced during photosynthesis process

Note: oxygen gas is consumed during respiration and combustion (burning) processes.

G.R.F.: Ratio of oxygen remains constant in air although it is consumed during respiration.

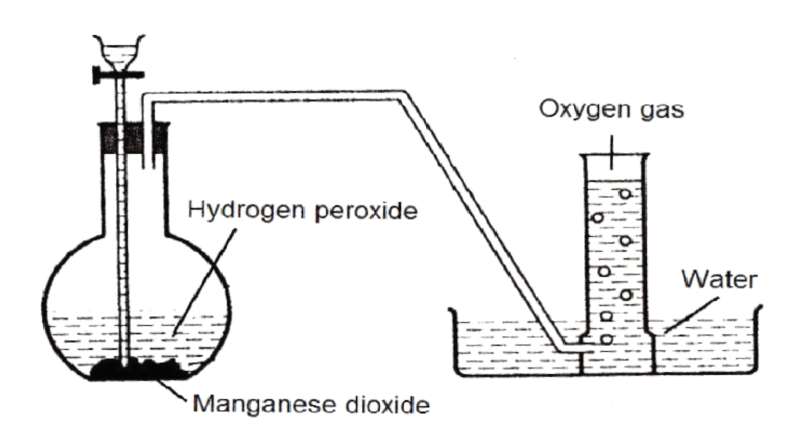
- Because green plants produce oxygen gas during photosynthesis process which compensate the consumed oxygen.

Preparation of oxygen:

By decomposition of hydrogen peroxide in presence of manganese dioxide as **catalyst**.

Hydrogen peroxide $\xrightarrow{\text{manganese dioxide}}$ **Water + oxygen gas**

Note: Oxygen is collected by downward displacement of water.



Catalyst:

A chemical substance that remains without a change in quantity and properties during chemical reaction.

Properties of oxygen:

1) Colorless, tasteless and odorless.
2) Scarcely dissolves in water.
3) Doesn't burn, but helps in burning.
4) Has neutral effect on litmus paper (red & blue).
5) Heavier than air.

Oxygen gas has the ability to unit (combine) with most elements forming element oxides.

Oxygen + Element ⟶ Element oxide

This combination can be in two ways:

1) Rapid and produces heat and light, it is called **Burning.**
2) Slow in presence of moisture, it is called **Oxidation.**

Burning	Oxidation
Rapid combination with oxygen and produces heat and light. **-Example**: burning of cleansing iron (The mass of the element increases after burning)	Slow combination with O_2in presence of moisture (water**)** **Example**: Iron rust

Uses of O_2

O_2

Respiration &compustion processes

Water molecule (H_2O)

Ozone gas (O_3)

Oxyacetylene flame (cutting & welding metals)

Mechanical ventillation

During diving &climping mountains

Give reason for:

1) Oxygen cylinders are used during climbing mountains.

- Because the ratio of oxygen in air decreases when we rise above earth's surface.

2) Ozone layer is very important for life on earth.

- Because it protects the earth from harmful radiation of the sun.

3) Oxy-acetylene flame is used in cutting and welding metals.

- Because its temperature reaches 3500^{o}c which is enough to melt metals.

Evaluation

a) Complete :

1-Oxygen molecule consists of……………….oxygen atoms.

2-Oxygen doesn't………………., but helps in………………….

3-Oxygen is collected by………………....displacement of……..…………....because it is ………….…….. dissolve in water.

4-Oxygen is pressed in cylinders to be used in ………… ,…………. and ……………….

5-Oxygen represents……………………..% of the total volume of the atmosphere.

6-Atmosphere protects the earth from …………comes from the sun , because it contains…………….layer

7-Oxygen combines with elements by two ways which are……………….and……………

8 -The mass of the element……………………………after burning.

9-The catalyst remains without any change in its …………….. and…………..during the chemical reaction.

10-Oxygen is scarcely soluble in……………………..

11-Oxygen has……………effect on red and blue litmus papers.

12 -Oxygen combines directly with most elements forming……………………

b) Write the scientific term :-

1- Objects help in condensing water vapor around them and falling the rain [……………………]

2- A gas molecule consists of 3 atoms of oxygen . [……………………]

3- A flame used in cutting and welding metals . […..………………]

c)Give reason for:

1- Oxy-acetylene flame is used in cutting and welding of metals

…………………………………………………………………………………………….
……………………………………………………………………………………………

2- Although smoke and dust particles in the atmosphere are considered as air pollutants they have an important role in formation of rain and snow .

…………………………………………………………………………………………….
……………………………………………………………………………………………

C) Notice the following figure and write down the labels on the figure :

1- …………………………………………

2- …………………………………………

3- …………………………………………

4- …………………………………………

5- …………………………………………

(1)

(3)

(4)

(2)

Lesson (2) : Carbon dioxide gas

Represents 0.03% of air volume

Structure: A chemical compound, its molecule consists of one carbon atom and two oxygen atoms (CO_2).

Sources of CO_2:

1) Respiration of all living organisms.
2) Combustion of organic materials such as wood, coal, oil, gasoline and tobacco (materials of cigarettes)

G.R.F:

- **CO_2 is very important for the plants.**

- CO_2 is important for photosynthesis process in plants to make food for plants and to build their bodies

- **The ratio of CO_2 in air increases in last years.**

- Due to:

1) Removal of forests
2) Burning of massive amounts of fuel

What happens when:

- **The ratio of CO_2 gas in air increases.**

- Suffocation of living organisms and severe harms to Earth's climate and raises its temp. (global warming)

- **The ratio of CO_2 gas in air decreases.**

- Green plants can't make photosynthesis process.

How can we detect presence of CO_2 gas:

❖ By using clear lime water, which turns turbid (milky) in presence of CO_2 gas due to formation of insoluble calcium carbonate.

G.R.F:

- **Clear lime water is used to detect presence of CO_2 gas.**

- Because it turns turbid (milky) in presence of CO_2gas.

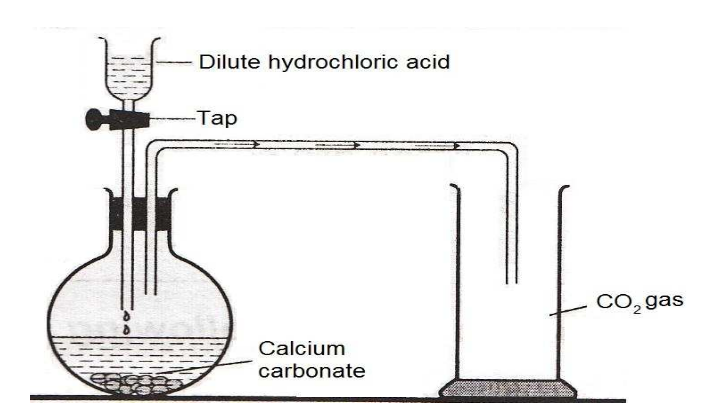
- **Clear lime water becomes turbid when CO_2 gas passes through it.**

- Due to formation of insoluble calcium carbonate.

Preparation of CO_2 gas:

By adding dilute hydrochloric acid to calcium carbonate.

- CO_2gas is collected by upward displacement of air, because CO_2gas is heavier than air.

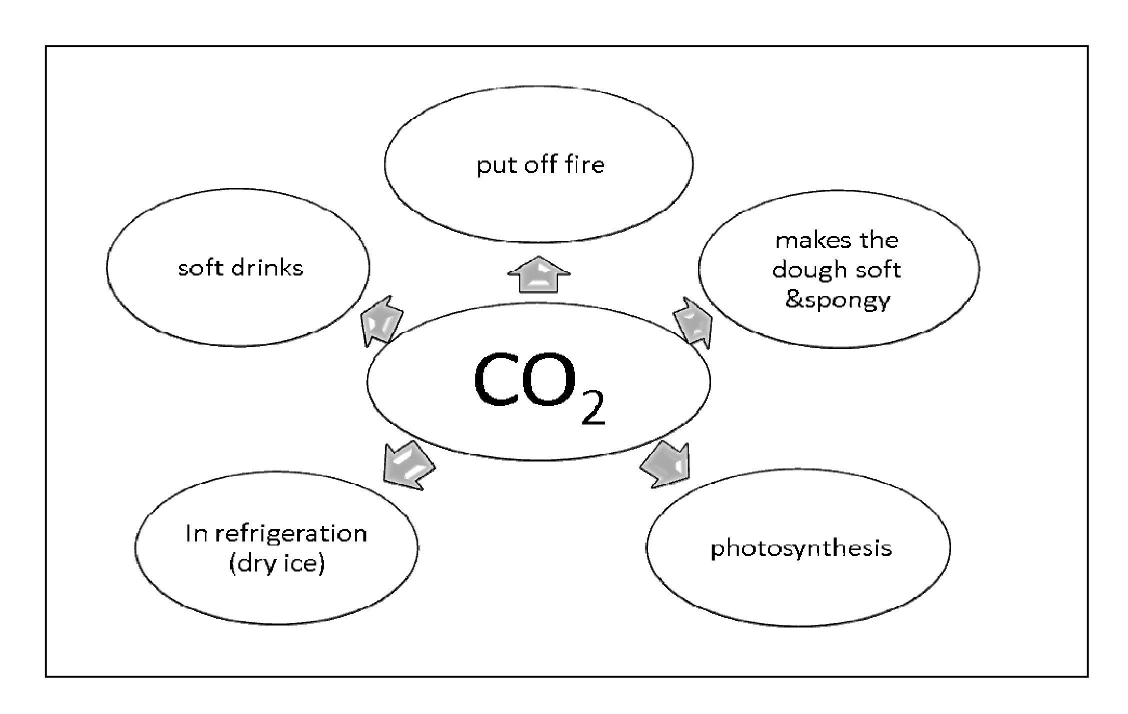


- CO_2gas isn't collected by displacement of water, because it easily dissolves in water.

Properties of CO_2 gas:

1) Colorless and odorless.
2) Heavier than air.
3) Easily dissolves in water.
4) Doesn't burn and doesn't help in burning (used to put off fire).
5) When a lighted magnesium ribbon is placed in cylinder filled with CO_2 gas, it keeps burning and turns into **white powder** (magnesium oxide) and **black precipitate** (carbon) deposits on the wall of the cylinder.

Uses of CO_2



Notes:

- Dry ice is the solid form of CO_2 gas and it is used in refrigeration.
- Yeast is added to dough (bread), to produce CO_2 gas which makes the bread porous and tasty.

G.R.F.:

1) Yeast is added to dough.

- To produce CO_2 gas which expands by heat and makes the bread porous and tasty.

2) Carbon dioxide is used to extinguish fires.

- Because it doesn't burn and doesn't help in burning.

Evaluation

I) Complete :

1- Carbon dioxide molecule consists of one …………atom and two………….atoms .
2- Carbon dioxide is not collected by ……………….displacement of water because it is …………….soluble in water .
3- Lime water turns milky in presence of ………………..due to the formation of …………… which is insoluble in water .
4- Carbon dioxide has a symbol of ……………………………..
5- Sources of carbon dioxide in air are ………………process of organic substances and ……………………..process of all living organisms .
6- Removal of forests increases the ratio of ……………….gas in the air .
7-Yeast is added to bread as it produces …………..which makes the bread ……………..…… and…………………..
8-A lighted magnesium ribbon keeps burning in presence of …………..gas and produces a white powder of ………………and ………………..deposition on the wall of the cylinder .
9-combustion of big amount of ……………..in factories and means of transport leads to increasing of ……………..gas in the air .

II) Give reason for :

1- Burning of magnesium ribbon in presence of CO_2 produces white and black substances .

………

2- CO_2 is collected by upwards displacement of air .

………

3- Cutting forests leads to increase of CO_2 percentage in nature .

………

4- CO_2 is used to extinguish the fire .

……………………………………………………………………………………………
…………………………………………………………………………………

5 - Photosynthesis process is important for plants and all living organisms .

……………………………………………………………………………………………
…………………………………………………………………………………

III) Write the scientific term :

1- Chemical substance formed by passing CO_2 gas over clear lime water . [ ]

2- A gas used in making soft drinks and dry ice . [ ]

3- The material that is used in cigarettes . [ ]

4- Substance used to detect the presence of CO_2 gas . [ ]

5- White powder produced from burning of lighted magnesium ribbon in CO_2 [ ]

IV) Look at the figure then answer :

1) **This figure represents preparation of ………………**
2) **Label the figure**

1- …………………………………

2- …………………………………

3- …………………………………

4- …………………………………

5- …………………………………

Lesson (3) : Nitrogen gas

Represents 78% of air volume

Structure:

Nitrogen molecule consists of two nitrogen atoms (N_2)

G.R.F.:

Nitrogen gas is called azote which means lifeless.

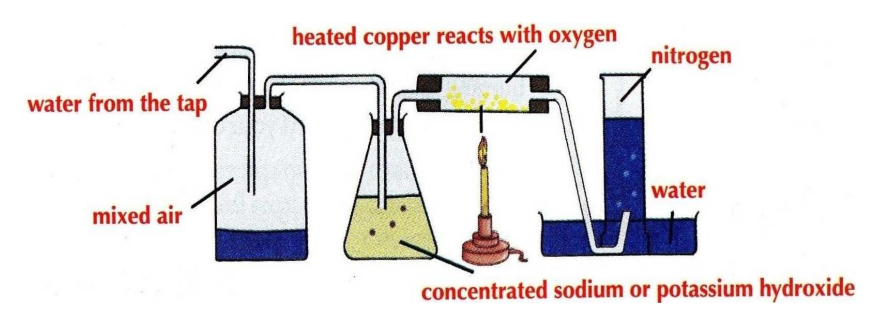
-Because it doesn't help in burning and it is not included in respiration process.

Existence of nitrogen gas:

- Main component of protein substance
- Contribute in the composition of all living tissues
- Legumes (clover, peas and soybeans) can produce protein from atmospheric nitrogen by the help of specific type of bacteria found in their roots.
- Nitrogen oxides are formed in the atmosphere during lightening, and they reach the soil with rain water (acidic rain).

Preparation of nitrogen gas:

- Nitrogen gas is prepared in lab from atmospheric air (78% of air volume).
- Preparation depends on removal of both oxygen and carbon dioxide, then collecting nitrogen gas.



- Air passes through conc. Sodium **or** potassium hydroxide to absorb CO_2 from air.
- Air passes through hot copper to remove $O_2$from air.
- Nitrogen gas is collected by downward displacement of water.

Properties of nitrogen gas:

1) Colorless, odorless, and tasteless.
2) Scarcely dissolves in water.
3) Doesn't help in burning.
4) It has neutral effect on litmus paper.
5) It is an inactive element (doesn't react easily with other elements).
6) It is condensed into liquid nitrogen
7) When a lighted magnesium ribbon is placed in a cylinder filled with nitrogen gas, a white substance is produced. By adding little water to the substance produced, a pungent smell evolves from ammonia gas.

Note:

Ammonia gas has alkaline effect on litmus paper (change red litmus paper to blue) while nitrogen gas has neutral effect on litmus paper

Nitrogen+ lighted magnesium ribbon ⟶ **White substance**

(Neutral)

White substance+ water ⟶ **Ammonia gas**

(pungent smell)

(Alkaline)

Give reason for:

1) **A pungent smell is evolved as a result of adding water to the product of burning magnesium in nitrogen.**

- Due to formation of ammonia gas which has a pungent smell.

2) **During preparation of nitrogen gas, air is passed over sodium or potassium hydroxide.**

- To remove CO_2 from air.

3) **The main source to prepare nitrogen is the air.**

- Because 78% of air volume is nitrogen gas.

4) **Nitrogen contribute in the composition of all living tissues.**

- Because it is the main component of protein substance which forms the tissues of living organisms.

<u>What happens in the following cases:</u>

1) **Combination between nitrogen and lighted magnesium ribbon, then adding water to the product.**

- A pungent smell of ammonia gas evolves.

2) **Passing atmospheric air over conc. Sodium or potassium hydroxide.**

- CO_2 gas is removed from air.

3) **Passing atmospheric air over hot copper.**

- Air is free of oxygen gas.

4) **Getting rid of soil bacteria.**

- Legumes as clover, peas and soybeans can't make protein.

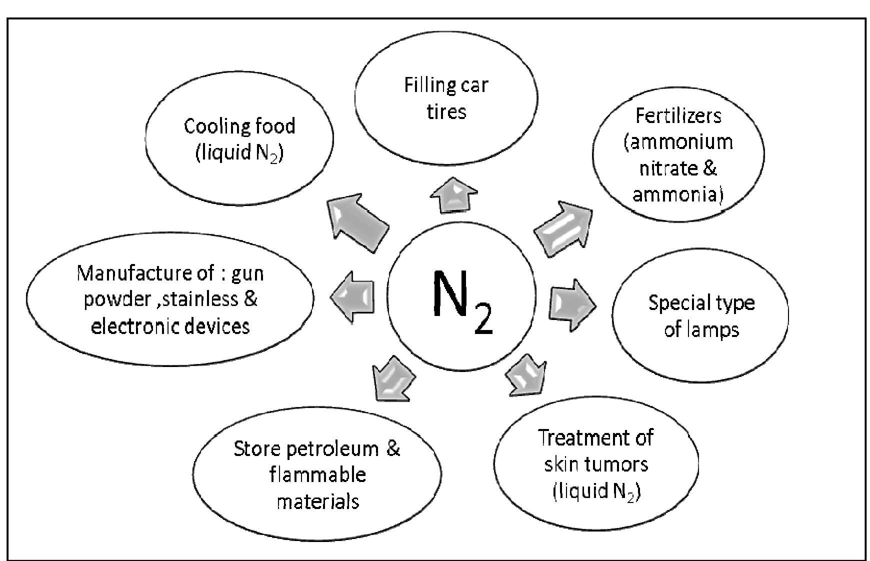
5) **Oxygen reacts with nitrogen during rain.**

- Nitrogen oxides are formed and reach the soil with rain water.

6) **The percentage of nitrogen gas decreases in nature.**

- Protein substances which forms the body of living organisms is not formed.

Uses of N_2



Lesson 3 : (Nitrogen Gas)

A)Complete:

1-Nitrogen molecule consists of…………………..atoms of………………

2-Nitrogen is……………….,……………………and…………………..

3-Nitrogen is the main component in all………………………..

4-Nitrogen represents………………..% of the earth's atmosphere.

5-Nitrogen oxide formed during………………..and reaches soil with…………

6-Nitrogen used in……………..,……………,………………. and ………………….

7-Agas used in manufacture of ammonia is………………

b) Give reason for:

1-Nitrogen gas is used in storing of explosive liquids.

………………………………………………………………………………………

2-The percentage of Nitrogen gas higher than that of Oxygen gas.

………………………………………………………………………………………

3-Nitrogen is called azotes which means lifeless.

………………………………………………………………………………………

4-During preparation of Nitrogen gas, air passed over hot copper.

………………………………………………………………………………………

5-A very pungent smell emitted when the products of combination nitrogen and magnesium is dissolved in water.

………………………………………………………………………………………

c)label figure:

a - ………………………………

b - ………………………………

c - ………………………………

d - ………………………………

e - ………………………………..

Test on unit (3)

1) Correct the underlined words :

1- **Carbon dioxide** gas is necessary for rusting process .

2- Oxygen consists of **triatomic** molecule .

3- Nitrogen can be condensed to a **solid** state .

4- **Hydrogen** is used in filling car tires .

2) Write the scientific term :

1- The main source of preparing nitrogen gas . [………………………]

2- A gas used by plant to make photosynthesis process . [………………………]

3- A mixture of gases that surround the earth and attracted to it by gravity .

[……………………….]

3) Give reason for :

1- Oxygen cylinder is used during climbing mountains .

………………………………………………………………………………………

2- The main source to prepare nitrogen is the air .

……………………………………………………………………………………….

4) Manganese dioxide which is used in preparation of oxygen is called a catalyst why ?

5) Compare between carbon dioxide and nitrogen gas according to the dissolving in water .

Unit (4) : Structure revision and function
Lesson (1) : Nervous system

✷ It is a communication and controlling device . How ?

- Nervous system receives information from environment and from the body .
- Interprets this information .
- Makes the body respond to this information .

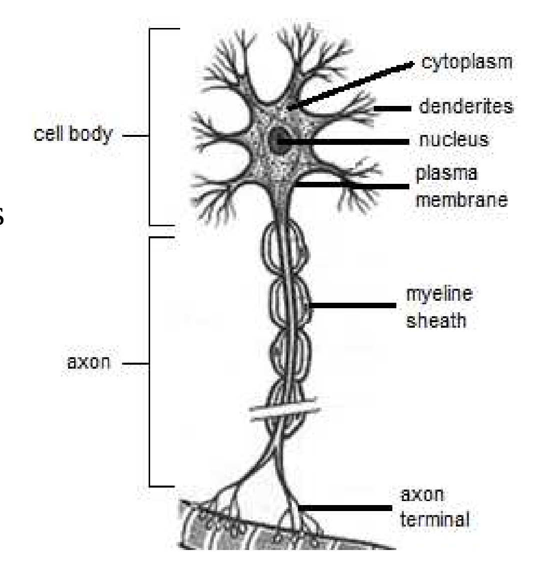
✷ Nervous system helps you to :

- Know if thing are hot , cold , sweet , bitter , rough or smooth .
- Adjust your movement .
- Makes you feel pain and solve problems.
- Adjust the responses that require emotions (happy , sad , angry , calm) .
- It control and coordinate the multiple function of human body (digestion , breathing , moving , ……………) .

The building unit of nervous system is Nerve cell Or Neuron .

Structure of neuron :

- The neuron consists of two main parts cell body and axon .
- The neuron's cell body consists of nucleus , cytoplasm and plasma membrane .
- There are branches extending from cell body called dendrites
- Function of dendrites : connect neighboring neurons forming synapse .
- The axon is covered by a fatty layer called Myelin sheath .
- The axon ends with nerve ending called axon terminals .



Function of axon terminals : They are connected to a muscle or form synapse with other neurons .

Nervous system consists of : central nervous system and peripheral nervous system .

First : Central Nervous system (CNS) :

- Consists of brain and spinal cord .

1) Brain :

- It is the main control center .
- It is like a computer but more complicated .
- Location : it is found inside a bony box called skull to protect it .
- Function : it directs and coordinates all processes , ideas , behaviors and emotions .

a) Cerebrum :

- It is the largest part of brain .
- Consists of two halves known as two cerebral hemispheres which are attached by nerve fibers .
- The outer surface of hemisphere is called cerebral cortex and it is gray .
- The surface of hemispheres is characterized by convolutions and folds .
- Function :

1- Controls the voluntary movement of the body as running in the race .

2- Receive nerve impulses from sense organs (eyes , ears , tongue and skin) and send the response to them .

3- Contain centers of thinking and memory .

b) Cerebellum :

- **Location** : it lies at the back area of the brain below the cerebral hemispheres .
- **Function** : Maintain the body balance during movement .

c) Medulla oblongata :

- **Location** : in front of cerebellum . it connects the brain to spinal cord .
- **Function** : Regulate the involuntary processes of the body as :
  - Heart beats .
  - Movement of respiratory system during breathing .
  - Movement of digestive system .

What happens when : infection of medulla oblongata .

- It leads to death of person .

Give reason for : infection of medulla oblongata leads to death . because it controls the involuntary processes like heart beats and movement of respiratory system during breathing .

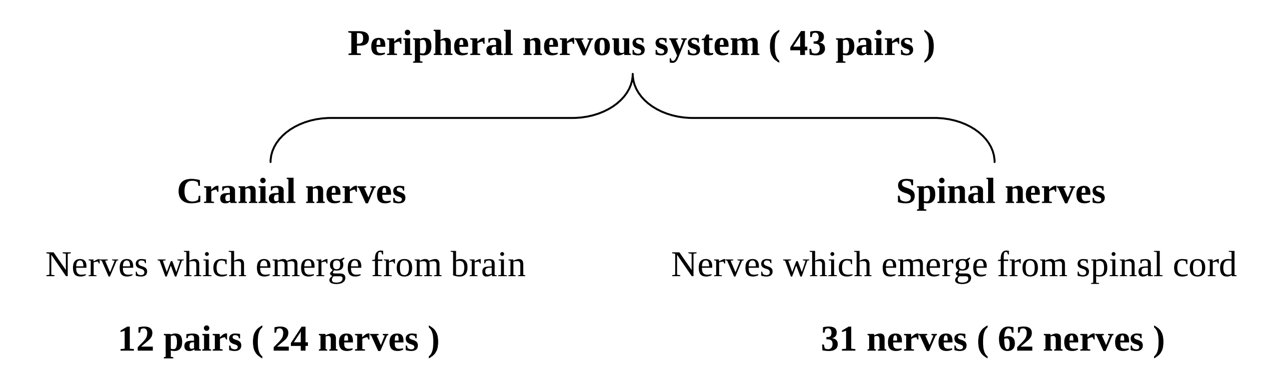
2) Spinal cord :

- It is a cylindrical cord and spinal nerves extend from it .
- **Location** : In a channel within series of vertebrae of vertebrae in the backbone .
- **Structure** : Spinal cord consists of internal grey matter in the shape of letter H surrounded by the white matter .
- **Function** : 1- Deliver nerve messages from body organs to brain and vice versa .

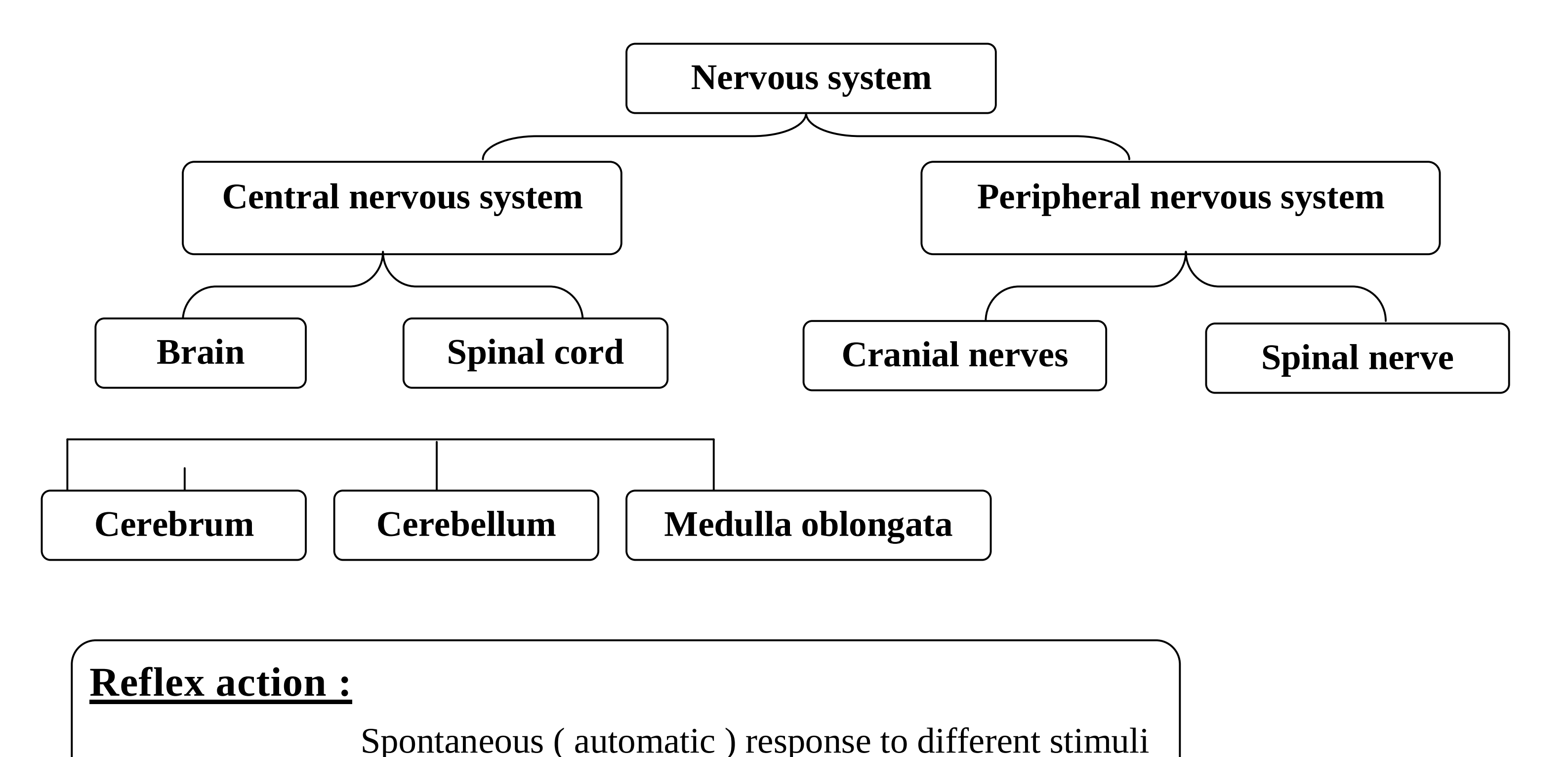
  2- Responsible for reflex action .

Second : peripheral nervous system :

- It is the nerves which emerge from CNS (brain & spinal cord) .



Function : carry sensory information and kinetic responses between CNS and all parts of the body .



Reflex action :

Spontaneous (automatic) response to different stimuli

Spinal cord is responsible for reflex action .

Examples of reflex actions :

1) Withdrawal of hand when you touch a hot surface .
2) Withdrawal of hand when you touch a plant thorn .
3) Blinking of eyes when something gets close .

How reflex action occurs ?

Example : Withdrawal of hand when you touch a plant thorn .

1) Nerve ending in finger produce nerve impulse .
2) Nerve impulse is delivered to spinal cord through sensory nerve fiber .
3) Nerve impulse from the spinal cord goes to arm muscle through motor nerves fiber .
4) Muscle contracts and withdrawal of hand away from the thorn .
5) Other nerve impulse goes from spinal cord to sensory center in brain leading to true sense of pain .

How can you maintain the nervous system :

1) Doing physical exercises .
2) Reduce drinking of tea and sugar (G.R.F) because it affects sleeping periods , heart beats and leads to nervous tension .
3) Stay away from tranquilizers and stimulants .
4) Take enough rest during sleep .
5) Avoid sitting for long period in front of TV (G.R.F) , because it exhaust the sense organs .
6) Keep away from source of pollution as noise and smoke (G.R.F) , because it passively affects the nervous system .

Unit 4:Structure and function

Lesson 1:Human nervous system

a)Complete:

1-The center of thinking and concentration lie in……………

2-The part responsible for keeping human body balance is…………………

3-The number of nerves in human body is…………………..

4-The components of the central nervous system are……………and…………………

5-The brain consists of………………..,…………..and……………….

6-The axon is a……………….. covered with a fatty layer called……………………

7-The internal matter of the spinal cord is ………… ,and the external is………………

8-……………… responsible for the reflex action.

9-The peripheral nervous system divided into ……………….. , ……………

10-From examples of reflex actions…………….,…………….and……………

b)Give reason for:

1-The cerebrum is a very important part of the brain.

……………………………………………………………………………………………

……………………………………………………………………………………………

2-The withdrawal of the hand quickly when it suddenly touches ahot surface.

……………………………………………………………………………………………

……………………………………………………………………………………………

3-You must stay away from the source of pollution.

……………………………………………………………………………………………

……………………………………………………………………………………………

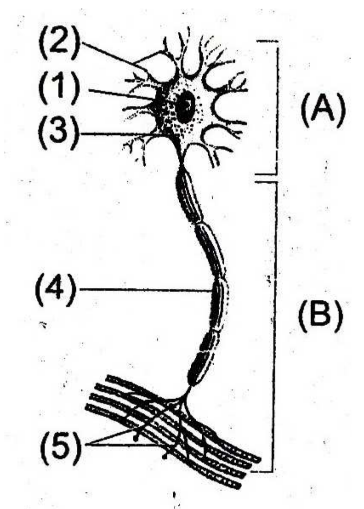
4-The infection of medulla oblongata leads to death.

……………………………………………………………………………………………

……………………………………………………………………………………………

<u>Look at the opposite figure and answer the following questions :</u>

1. This figure indicates the structure of ……………..



2 . Complete :

- Part (A) represents the ……………….

- Part (B) represents the ……………….



3 . Write the labels .

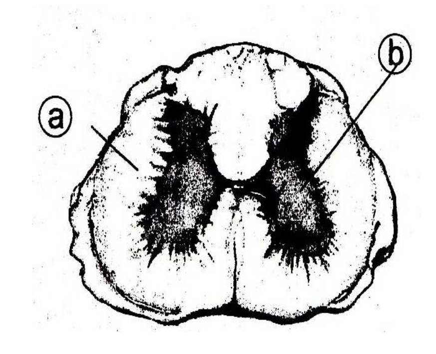
1) ……………. 2) ……………….

3) ……………. 4) ……………….

5) …………….

Observe the opposite figure , then complete :

1. This figure represents ………………….



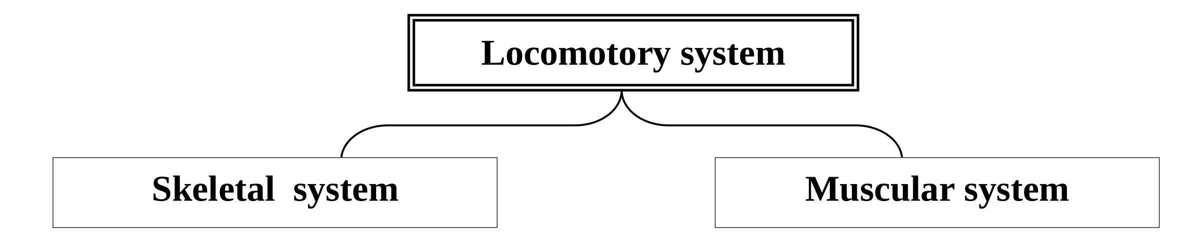
2. Write the labels .

a) ……………….. b) ……………..

3. The structures (a) and (b) are located in the …………… of the brain .

Lesson (2) : Locomotory system

- Movement is one of the characteristics of living organisms .
- Movement is the change of position from one place to another .
- A man move either to seek for a benefit or to escape from harm .
- Movement occurs by integration and participation of muscular system and skeletal system under control of nervous system .
- Skeletal system and muscular system together are called locomotory system .



First : skeletal system :

1) Axial skeleton :

It consists of skull , backbone and rib cage .

a) Skull :

- A bony box contains cavities for eyes , ears and nose .
- **Function** : Protect the brain .

b) Backbone :

- Consists of 33 vertebrae , between them cartilage to prevent friction during movement .
- **Function** : 1- Protect the spinal cord .

  2- Allow the body to bend in different directions .

What happens when : - There is no cartilage between vertebrae .

- There will be friction during movement .

c) Rip cage :

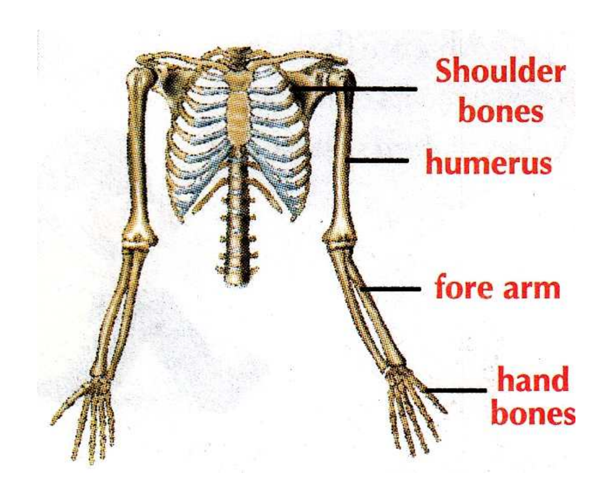
- Consists of 12 pairs of ribs , the first 10 pairs are connected anteriorly to sternum (breast bone) .
- **Function** : 1- Protect heart and lungs .

  2- Help in inhalation and exhalation processes .

2) Appendicular skeleton :

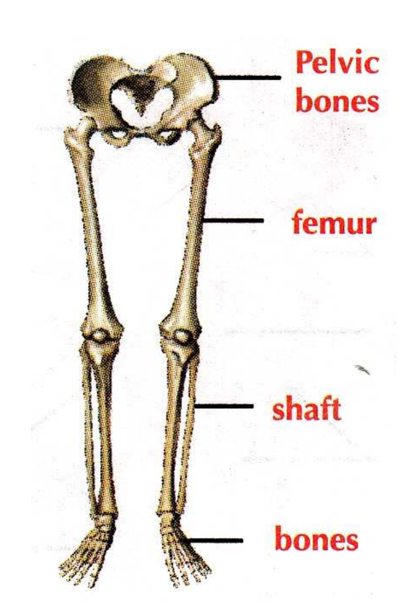
It consist of upper limbs and lower limbs .

a) Upper limbs (arms) :



- Humerus bone , forearm bones and hand bones .
- Connected to shoulder bone .
- Function : Allow eating , drinking , writing , holding things , …………

b) Lower limbs (legs) :



- Femur bone , shaft bones , and foot bones .
- Connected to pelvic bones .
- Function :

1- Allow walking , running , standing , …………..

2- Carry the rest of body .

Joints :

- Area of meeting of two bones .
- Function : Allow movement of the body .
- What happens if : - There is no joint between bones .

  - There will be no movement .

Type of joints

Immovable joint	Slightly movable joint	Freely movable joints
They don't allow any movement	They allow movement in one direction only	They allow movement in all directions .
Ex : skull joints	Ex: knee and elbow joints	Ex : shoulder , wrist and thigh (hip) joints

What happens if :

3) Knee joint becomes from freely movable joint . It will move in all directions .
4) Shoulder joint become from slightly movable joint . It will move in one direction only .

Second : Muscular system :

Muscles are considered the engine of the body .

Give reason for : Muscles play an important role during movement of the body .

- Because they generate mechanical energy during contraction and relaxation .

Types of muscles

Voluntary muscles

Move under your control

Ex: Limbs , trunk , face and abdominal wall muscles .

Involuntary muscles

Work automatically without your control

Ex: blood vessels , bladder and gastrointestinal tract muscles .

Example : Movement of arm :

Case (1) : Front muscle contracts , back muscle relaxes , arm moves up

Case (2) : Front muscle relaxes , back muscle contracts , arm moves down .

How to maintain the locomotory system :

1) Vaccination against polio virus .
2) Eat healthy food rich in calcium , phosphorus and vitamin D (G.R.F)

to prevent bone diseases like steomalacia and rickets .

3) Avoid behaviors that lead to bone fracture (jumping from high places , making violent movement) .
4) Doing physical exercises .

5) Avoid carrying heavy things .
6) Expose to sunlight for suitable periods .
7) Sitting and standing in a correct way .

Lesson 2:Human locomotory system.

a) Complete:

1-The axial skeleton consists of …………,…………and…………….

2-The function of the backbone is ………….and…………………

3-The ribcage protects …………………. and……………..

4-The main function of the skull is ………………..

5-Muscles are fixed to bones by long strips called……………

7-The skeleton which includes skull is called ………………… skeleton.

8-The knee joint is………………..movable joint.

9-The function of upper limbs is…………………..

Examine the opposite figure, then answer :

1. The figure represents the …………… skeleton

and the bones of …………….

2. Label the bones from (1) to (7) .

1) ………………   2) ………………..

3) ………………   4) ………………..

5) ………………   6) ………………..

7) ……………...

3. Name the joints (a) and (b) then mention the type of each .